
Identification of piRNAs in the central nervous system.

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Public Summary:

Piwi-interacting RNAs (piRNAs) are small noncoding RNAs generated by a conserved pathway. Their most widely studied function involves restricting transposable elements, which are DNA elements that jump from place to place. Another set of piRNAs now appears to have a role in the regulation of mRNA from early embryos and gonads. We report a more widespread expression of a limited set of piRNAs and particularly focus on their expression in the hippocampus. Our experiments suggested a role in spine morphogenesis, thought to be important in memory and learning. Possible targets include genes which control spine shape.

Scientific Abstract:

Piwi-interacting RNAs (piRNAs) are small noncoding RNAs generated by a conserved pathway. Their most widely studied function involves restricting transposable elements, particularly in the germline, where piRNAs are highly abundant. Increasingly, another set of piRNAs derived from intergenic regions appears to have a role in the regulation of mRNA from early embryos and gonads. We report a more widespread expression of a limited set of piRNAs and particularly focus on their expression in the hippocampus. Deep sequencing of extracted RNA from the mouse hippocampus revealed a set of small RNAs in the size range of piRNAs. These were confirmed by their presence in the piRNA database as well as coimmunoprecipitation with MIWI. Their expression was validated by Northern blot and in situ hybridization in cultured hippocampal neurons, where signal from one piRNA extended to the dendritic compartment. Antisense suppression of this piRNA suggested a role in spine morphogenesis. Possible targets include genes, which control spine shape by a distinctive mechanism in comparison to microRNAs.

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